

WA
240
C719r
1945



PROPERTY OF THE
**NATIONAL
LIBRARY OF
MEDICINE**

of

NATIONAL LIBRARY OF MEDICINE

8 070

-by-

A. T. Rossano, Jr., B.S., M.S.

COLORADO DIVISION OF PUBLIC HEALTH
Colorado, Division of Industrial Hygiene
620 Colorado Building
Denver 2, Colorado

Pamphlet
RA644
.P8R8

WA

240°

qC719r
1945

c.1

NATIONAL LIBRARY OF MEDICINE
WASHINGTON, D. C.

6220059

DDT SPRAYING ACTIVITIES DURING THE 1945
POLIOMYELITIS EPIDEMIC IN DENVER, COLORADO

1945
68 cases
11 deaths
July - over
started late
in June

Division of Industrial Hygiene
Colorado Division of Public Health

November 27, 1945

On August 22, 1945, a meeting was called by Dr. Cleere, Secretary and Executive Officer, Colorado Division of Public Health, to discuss plans for combating the increasing rate of poliomyelitis in Denver. Among those present at this meeting in addition to Dr. Cleere were Dr. Chadwick, Colorado Venereal Disease Control Division, Mr. Carl Schwalb, Denver Manager of Health and Charity and ourselves.

It was agreed that while the reported number of cases was not alarming, some tentative arrangements should be made for a specific plan of action to be initiated should the incidence of poliomyelitis reach epidemic proportions.

A. The Plan

In general the offensive plan included three major measures. These were:

1. Epidemiological Investigation. Forms were to be prepared and employed to investigate each reported case of polio.
2. Prevention and Control. This represented the adoption of appropriate sanitary procedures for the control of those underlying factors generally responsible for the dissemination of disease. One of these factors is the control and elimination of flies and similar insect pests.
3. Health Education. This included keeping the public and medical profession informed by appropriate press and radio releases, bulletins, etc., of the progress of the disease and appropriate preventive measures.

At a staff meeting on August 27th it was felt that developments indicated the need to put the plan into operation.

- B. Material and Equipment To this Division was entrusted the task of implementing the second measure as it applied to the control and elimination of flies and similar insect pests. It was decided to employ the new insecticide, DDT (dichloro-diphenyl-trichloroethane). This powerful insecticide had been used in connection with a recent polio outbreak in Rockford, Illinois where it had been broadcast from the

air by means of an airplane. We felt that this manner of application was indiscriminate and should be discarded in favor of a more selective method. It was decided to spray selected areas by means of knapsack sprayers and volume mechanical sprayers. Mr. Crammer, Manager of Parks and Improvements, City of Denver, very graciously offered us the use of a tree-spraying truck and crew. In addition he granted us permission to utilize the office and garage facilities at City Park as our headquarters.

From the U. S. Public Health Service, Malaria Control in War Area Headquarters at Atlanta, Georgia, we received by air express a shipment of DDT powder and six knapsack sprayers equipped with special flat-spray nozzles.

Shortly after our spraying program got under way the U. S. Army Air Forces, Western Technical Training Command, offered us the services of Mr. R. Simpson, Sanitary Engineer at Buckley Field as well as men and equipment. Equipment consisted of knapsack sprayers and two army type decontaminating units. Each unit consisted of a large truck provided with a 400 gallon tank, two long hoses with spray guns, and a compressor capable of producing a pressure of 400 pounds per square inch. In addition, the Army supplied us with liquid insecticide (5% DDT in kerosene) from their own stock, which we later replaced.

Large quantities of Xylol, wetting agent, Diesel Oil and additional quantities of DDT were purchased locally.

C. Procedure. The control work centered about three main activities:

- 1) DDT residual spraying of residential districts having the highest number of reported cases.

In spraying residential districts two methods were employed:

- a. Men provided with knapsack sprayers filled with a solution of 5% DDT in kerosene moved through the alleys spraying garbage racks, incinerators, backyards, etc.
- b. The large power sprayers moved through the alleys spraying 2 $\frac{1}{2}$ % DDT emulsion in a similar manner. (The emulsion was a mixture of DDT, Xylol, wetting agent and water).

No attempt was made to treat the interior of dwellings.

2) DDT spraying of insect breeding areas such as public dumps, stables, the Denver Stockyards, etc.

- a. In spraying the breeding areas a power sprayer provided with about $\frac{1}{2}\%$ DDT in Diesel Oil was used to saturate the ground infested with fly larvae which would otherwise have been unaffected by ordinary DDT residual spraying.

The above procedure was followed in Denver as well as a few communities around the State which had requested this service.

3) Insect control work at selected locations.

In addition to the spraying of residential districts and fly breeding areas, plans were formulated and carried out for the control of insects in:

a. Garbage trucks

In cooperation with the garbage collectors in Denver a program for spraying all garbage trucks was evolved. The trucks were assembled at a central point outside the city limits and thoroughly sprayed with 5% DDT in kerosene by means of knapsack sprayers.

b. Restaurants

In cooperation with the Denver Restaurant Owner's Association large scale demonstrations of DDT spraying of eating establishments were held.

c. Dairies

Actual demonstrations of DDT spraying were performed at two Denver dairies.

The objective of the garbage truck, restaurant and dairy spraying demonstrations was primarily to offer information on the latest techniques in insect control and to stimulate interest on the part of various commercial groups in establishing their own insect control programs.

Throughout the epidemic a considerable amount of information was released to the public regarding the use of DDT in controlling flies and other insect pests. The spraying activities were continued for about one month, beginning August 28, 1945.

TABLE I

TABULATION OF SPRAYING ACTIVITIES SHOWING MATERIALS, LOCATIONS & COSTS*

1	2	3	4	5	6	7	8
Type of Insecticide	Composition	Equipment Used	Locations Treated	Quantity of Insecticide Used (gal.)	Gross Area Treated (sq.mi.)	Cost \$	Cost Per Sq. Mi. \$
Solution	5% DDT in Kerosene	Knapsack sprayers	Residential Areas	225	0.14	260	1,900
Emulsion	2½% DDT, xylol, wetting agent and water.	City tree Sprayer	"	2,000	10.66	400	38
Diesel oil	½% DDT	Army decontaminating truck	Dumps stockyards, etc.	4,200	2.22	475	214

* All figures in columns 5 to 8 are approximate.

In the treatment of residential areas it was found that the use of DDT emulsion applied by means of mobile power sprayers effected a tremendous savings of time, labor and materials in comparison with the use of DDT solution applied by knapsack sprayers.

D. Acknowledgments.

In all of this work due credit should be given to Messrs. A. Ashcraft, F. W. Lloyd, Cusack and Dolan of the Colorado Division of Public Health, Mr. Scott, Chief Sanitary Inspector, City of Denver as well as Lt. Colonel L. F. Johnson, Major Creitzberg, Mr. R. Simpson and officers and enlisted men of the Western Technical Training Command Headquarters, Denver, who participated in this program for their genuine interest and invaluable assistance.

A. T. Rossano, Jr., Director
Division of Industrial Hygiene

A P P E N D I X

1. Pictures of Spraying Procedures.

2. Map Showing Gross Areas Sprayed.

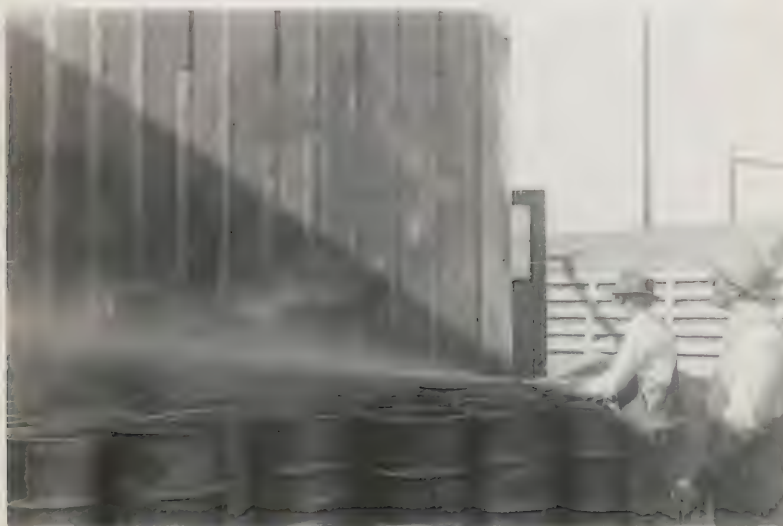


SPRAYING OF ALLEYS AND BACKYARDS BY MEANS OF
KNAPSACK SPRAYERS CONTAINING 5% DDT IN KEROSENE



EXAMPLES OF FLY INFESTATIONS FOUND IN SOME RESIDENTIAL AREAS

This emphasizes the role of domestic garbage in fly breeding, and the importance of proper domestic garbage disposal. Only "controlled" spraying of specific areas as against indiscriminate spraying can eliminate such foci of infestation.



A RENDERING PLANT --

An important fly breeding area.
A 2½% DDT emulsion was applied by means of a mobile
tree sprayer.



The ground at dumps, stockyards, stables, etc. was literally teeming with fly larvae at 1 to 2 inches below the surface.

An Army Decontaminating truck was adapted for use in saturating the ground with Diesel Oil containing about 1/2% DDT.



The Diesel Oil soaked through the debris and effectively eliminated the fly larvae.

Residual spraying alone would have had little or no effect on the larvae thriving below the ground surface.



Spraying garbage trucks, which had been purposely assembled at a central point outside the city limits. Knapsack contains 5% DDT in kerosene.

Den

The h
each nam
and figu
avenues
streets n
the diag
"Court"
running
designate
east and
The ho
and sout
and east
By using
streets, 1
street, it
cated by
around
In the
streets
tending
Broadwa
the num
ness dis
Collax A
ness dis
in the l
the edge
Streets
are diag

Name
Acoma
Adams
Alameda
Alaska
Albany
Aleut
Alice
Annie
Arap
Archie
Ariz
Arizo
Atka
Ark
Ash
Ashi
Baldy
Bann
Barbe
Bass
Batay
Bay
Beach
Beck
Bella
Bente
Brigh
Blake
Bonni
Bosle
Bould
Bould
Brigh
Broad
Bryar
Byers
Byron
Cable
Cahit
Cait
Calif
Cano
Cedar
Cent
Cent
Char
Cher
Cher
Ches
Chey
Cirel
Clarl
Clau
Clay
Clay
Clay
Cler
Clev
Clyd
Colfa
Colfa
Colle
Color
Color
Colun
Conej
Cook
Coron
Court
Court
Cove
Curris
Curtis
Custe
Dahh
Dahh
Dale
Deat
Delaw
Delga
Denve
Detro
Dexte
Divisi
Dougl
Down
Dunke
Eight
Eight
Eight
Eight
Elati
Elever
Elwin
Eliok
Elizab
Elk P
Ellsw
Elm C
Elm
El Re
Emer
Erie
Esolat

RECEIVED
INDUSTRIAL HYGIENE

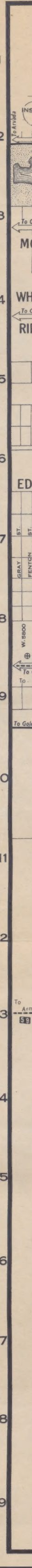
SEP 26 1945

STATE DIVISION OF
PUBLIC HEALTH

MAP SHOWING GROSS AREAS SPRAYED

Name	Number	Key
Adams St.	W1000	Q
Lincoln St.	E100 - H	H
Lipin St.	W1550 - C	C
Lyle St.	W1600 - Q	Q
Longfellow St.	W1600 - Q	Q
Logan St.	E1000 - H	H
Louis St.	W1600 - H	H
Will Blvd.	W1600 - C	C
Lyle Ct.	E1250 - E	E
Madison St.	W1600 - Q	Q
Magnolia St.	W2100 - F	F
Maple Ave.	E1400 - H	H
Maple St.	E1400 - H	H
Mariposa St.	W1200 - F	F
Market St.	W1700 - F	F
May St.	W1700 - F	F
Medea Way	M - L	L

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
84



11/45

NATIONAL LIBRARY OF MEDICINE



NLM 02146807 7